EA No. OR125-97-12

Dear Citizen:

Enclosed is a copy of the Environmental Assessment (EA) and the Finding of No Significant Impact (FONSI) for culvert restoration in the Umpqua Resource Area of the Coos Bay District (CBD). The eight culverts proposed in this EA are part of the 1997 Jobs-in-the-Woods initiative. The replacement culverts have been designed to handle projected 100-year flood events, and restore passage to aquatic organisms (i.e. fish, amphibians & invertebrates).

These projects comply with objectives of the CBD's Resource Management Plan, which is tiered to the Northwest Forest Plan, to conduct watershed projects to restore aquatic and riparian habitats, native fish and wildlife populations, and water quality. The Proposed Action continues implementation of district Transportation Management Objectives and aquatic habitat restoration recommendations in the first iteration watershed analysis documents for these project areas.

You are encouraged to read the EA and comment on the adequacy of the FONSI prior to the preparation of the Decision Document. The Decision Document is scheduled to be finalized after a 30 day comment period which ends **June 19, 1997**. Questions on this EA or written comments concerning the adequacy of the FONSI should be addressed to Scott Knowles in the CBD office at the above address, or by calling (541) 756-0100, Monday through Friday 8:00 a.m. to 4:30 p.m.

Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours (8:00 a.m. to 4:30 p.m.), Monday through Friday, except holidays, and may be published as part of the EA document or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representative or official of organization of businesses, will be made available for public inspection in their entirety.

Sincerely,

_____

Daryl L. Albiston
Umpqua Area Manager

EA No. OR125-97-12

Finding of No Significant Impact
For
EA No. OR125-97-12

An interdisciplinary team, for the Umpqua Resource Area of the Coos Bay District (CBD) of the Bureau of Land Management (BLM), has reviewed the proposed restoration projects which will be funded by the Jobs-in-the-Woods program. The Proposed Action, with design features, and a No Action Alternative are described in the attached Environmental Assessment (EA) No. OR125-97-12.

The Proposed Action will replace eight culverts that are failing, undersized, and/or inappropriately designed for aquatic organisms passage. The design features identified in the Proposed Action should assure that NO significant adverse impacts would occur to the human environment. There should be no effects on Air quality, Areas of Critical Environmental Concern, Cultural or Historic Resource values, Farmlands, prime or unique, Native American religious concerns, Hazardous waste, Wild and scenic rivers, Wilderness values, or Noxious weeds. There could be minor short-term impacts to Flood Plains, Threatened and Endangered Species, Water Quality, and Wetland and Riparian Zones. The Proposed Action has been designed to minimize disturbance effects on the northern spotted owl and marbled murrelet.

A programmatic Biological Assessment to address the effects of various restoration projects (including culvert modification and replacement) was prepared in 1995 and submitted to the United States Fish and Wildlife Service (USFWS) through the consultation process provided under Section 7(A)(4) of the Endangered Species Act of 1973 (16 U.S.C. 156(A)(2) and (A)(4) as amended). The USFWS prepared a biological opinion which authorized these types of actions and any associated incidental take, provided the proposed projects comply with the guidelines established in the Biological Assessment and the Mandatory Terms and Conditions described in the Biological Opinion. This Biological Opinion in Memorandum 1-7-95-F-250 issued July 10, 1995 is available for review at the CBD Office of the BLM.

A joint Biological Assessment for the implementation of resource management plans for the BLM and United States Forest Service (USFS) was also prepared and submitted to National Marine Fisheries Service (NMFS) in 1996 to address the effects of BLM and USFS resource management plans on the Endangered Umpqua Basin cutthroat trout. Project categories included restoration activities such as culvert replacement. The NMFS returned a Biological Opinion authorizing these types of actions and any associated incidental take, provided the proposed projects comply with the guidelines established in the Biological Assessment and the Mandatory Terms/Conditions described in the Biological Opinion. This Biological Opinion was issued March 18, 1997 and is available for review at the CBD Office of the BLM.

The attached EA is tiered to the following: The *Coos Bay District Resource Management Plan* and *Environmental Impact Statement* and its *Record of Decision* (BLM, 1995). The *Final Supplemental Environmental Impact Statement of Management of Habitat for Late-Successional and Old-Growth*

Forest Related Species Within the Range of the Northern Spotted Owl and its *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl*, (Northwest Forest Plan [NWFP]) (Interagency, 1994). This EA considers recommendations from the first iterations of the *Mid Smith River* and *Oxbow*, watershed analysis documents (BLM, 1995), and the *West Fork Smith River* watershed analysis document (BLM, 1996).

Determination:

On the basis of the information contained in the EA, and all other documentation available to me, it is my determination that the Proposed Action does not constitute a major Federal Action affecting the quality of the human environment. Therefore, an Environmental Impact Statement (EIS) is unnecessary and will not be prepared for these projects.

Daryl L. Albiston
Umpqua Area Manager

Date

In Reply Refer To:
EA No. OR125-97-12

DECISION RECORD
FOR
JOB IN THE WOODS
AQUATIC ORGANISM PASSAGE

EA No. OR125 - 97 - 12

Decision:

It is my decision to implement Alternative 2, the Proposed Action, to replace some older under designed and/or failing culverts. The new culverts are designed to handle 100-year flood events and restore passage for aquatic organisms.

The project areas, located throughout the Umpqua Resource Area of the Coos Bay District, are as follows:

A. Middle Smith River Watershed Analysis Document
    Bear Creek - one culvert
B. West Fork Smith River Watershed Analysis Document
    Beaver Creek - one culvert
    Moore Creek - one culvert.
C. Oxbow Watershed Analysis Document
    Big Creek - five culverts.

The design features in the Environmental Assessment Numbered OR125-97-12 are accepted as described.

Rationale for Decision:

The Proposed Action is selected for the following reasons.

- The Proposed Action should reduce long term sedimentation from the culvert sites before their failure causes the road fill or hill slopes to erode into the stream systems.

- The Proposed Action should improve access for aquatic organisms between mainstem and tributary streams

- The Proposed Action is tiered to and in compliance with the following: The *Mid Smith River* and *Oxbow* watershed analysis documents (BLM, 1995), and the *West Fork Smith River watershed* analysis (BLM, 1996). The *Coos Bay District Resource Management Plan* and

Environmental Impact Statement and its *Record of Decision* (BLM, 1995). The *Final Supplemental Environmental Impact Statement of Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* and its *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (Interagency, 1994) (*Northwest Forest Plan).*

Monitoring:

Short term monitoring of the project design features will be conducted by project inspectors during the life of the contract. Long term monitoring will be conducted by periodic field inspections by area employees and road maintenance personnel, or affected resource specialists, as detailed in the Proposed Action of the EA.

[signed by Jon Menten for] June 23, 1997
Daryl L. Albiston Date
Umpqua Area Manager

EA No. OR125-97-12

ENVIRONMENTAL ASSESSMENT
OR125-97-12

A Proposal to Conduct Watershed Restoration Projects
Through Jobs-In-The-Woods Funding
In The Oxbow, Mid Smith River, and West Fork Smith River Analysis Areas
Umpqua Resource Area
Coos Bay District
Bureau of Land Management

PROPOSED THIS 19th DAY OF MAY, 1997

This action is tiered to the *Coos Bay District Resource Management Plan* (RMP) and *Environmental Impact Statement* and its Record of Decision (BLM-May, 1995). It is in conformance with the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the range of the Northern Spotted Owl* and its Record of Decision (Northwest Forest Plan - Interagency, 1994).

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Section I - Purpose of & Need for Action

Background

The Coos Bay District (CBD) of the Bureau of Land Management (BLM) is under the direction of the *Coos Bay District Resource Management Plan* (RMP) and *Environmental Impact Statement* (EIS) and its Record of Decision (ROD)(BLM, 1995). The RMP and its' ROD are in conformance with the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the range of the Northern Spotted Owl* and its ROD (Northwest Forest Plan [NWFP]) (Interagency, 1994). The above documents are hereby incorporated by reference. Through these documents the BLM, in conjunction with other Federal land agencies, is directed to conduct watershed analysis, and restoration projects, to aid in the recovery of water quality and aquatic, riparian, and terrestrial habitats. The BLM Umpqua Resource Area (URA) analyzed the Oxbow (BLM, 1995), Mid Smith River (BLM, 1995), and West Fork Smith River (BLM, 1996), Watersheds (first iterations), hereby incorporated by reference.

Purpose

The purpose of this EA is to: 1) assess any potential environmental impacts that may result if the No Action Alternative or the Proposed Action is implemented and 2) document the decision making process involved. BLM is funding these projects in response to a Jobs-In-The-Woods initiative, public concern, and a commitment to safeguarding and restoring ecological sustainability of public lands through principles of ecosystem management. This EA uses recommendations from the above documents and Transportation Management Objectives (TMO) in regards to roads, water quality, and fish and amphibian passage barriers. The primary goals are to restore, enhance, and maintain ecological functions and biological productivity on public lands in the Coos Bay District. And specifically at these sites to improve amphibian and fish passage, and hydrologic functions (including ground and surface water flow pattern, thereby, reducing the potential for sediment delivery to streams from road surfaces, stream diversions, and culvert or road-related failures).

Need

Due to the extensive road network present on public and private lands within the Coos Bay District, most perennial streams on forest lands are crossed multiple times by roads, substantially affecting the quality and continuity of aquatic ecosystems. Coast Range streams depend heavily on debris slides and torrents for the recruitment of instream material, to provide for roughness and aquatic habitat components. This material is also critical in the dissipation of stream energy. Roads and stream crossing structures function as dams that constrict flow through a single narrow outlet and prevent transportation of material down the channel thus eliminating floodplain functions where present. These structures tend to be constriction points in the channel and cause deposition and channel widening at the inlet. The outlets are normally downcut and scoured by the high velocity water caused by the constriction

of the culvert.

Roads and stream crossing structures have also been shown to function as barriers to the movement and dispersal for many fish and wildlife species. For example, deMaynadier and Hunter (1995) found that a 12m (39 foot) wide gravel road significantly inhibited the movement of the terrestrial Western Red-backed salamander. A similar road would likely serve as a nearly impassable barrier for the Southern Torrent Salamander, which is rarely found farther than 1m (3 feet) from a stream (Blaustein et al 1995, Bury pers. comm., Applegarth pers. comm.). Culvert outlets not in contact with stream bottoms do not allow access into culverts. Installation of undersized culverts constrict flows creating high velocity barriers and eliminating substrate from culvert bottoms. These barriers can isolate small populations, limiting or preventing genetic exchange between populations, and preventing recolonization of historic or recovering habitats. If these barriers remain in place for extended periods of time, isolated populations may die out from population fluctuations, or be eliminated from an area by catastrophic changes to the stream habitat. If barriers prevent species from recolonizing recovering habitats, the viability of local or regional populations may be threatened. Hence, stream crossing structures need to be modified to reduce barriers to aquatic and riparian associated species.

Additionally, many of the culverts are in need of repair or replacement to reduce the risk of failure and/or to be sized and installed more appropriately to pass the water and debris associated with a 100 year storm event. Historically, most culverts were sized to pass 25 to 50 year events.

The watershed analysis (WSA) process utilized the *Western Oregon Transportation Management Plan* (BLM, June 1996) and Coos Bay Transportation Management Objectives (TMO) data dictionary, hereby incorporated by reference, to recommend appropriate road management for multiple resource objectives. The WSA and TMO process is an interdisciplinary team approach, whose recommendations include identifying roads needed for a permanent road system and levels of closure for roads not needed. Roads considered in this EA have been identified as components of the permanent transportation system and are paved mainline roads with reciproc-of-ways and are to be maintained for forest operations and public access.

Geographical Area

Proposed project sites are scattered throughout the URA of the Coos Bay District, and are listed in Table 1. Also, in the appendix are Exhibit A location maps.

Issues, Concerns, and Opportunities

The issues, concerns, and opportunities (henceforth referred to as “issues”) were developed by the Interdisciplinary Team (IDT) assigned to this EA. No requests for information, notification, or any public interest was expressed in response to our Fall 1996 or Spring 1997 Planning Update publication. The principle issues identified were**:**

Amphibian movement and dispersal
Most existing culverts, even those designed to allow juvenile salmonid passage, function as barriers to upstream movement and dispersal of stream and riparian associated amphibians. Due to the extensive road network, culverts are abundant, and isolate less mobile amphibians in small meta-populations. These meta-populations are vulnerable to extirpation from human or natural disturbances, and the barriers to movement prevent amphibians from recolonizing these impacted habitats once they recover.

Movement and dispersal of fish
Many existing culverts only allow adult salmonid passage while others do not allow for any fish passage. The majority of all existing culverts may function as barriers to juvenile or non-salmonid fish species such as sculpin or dace, as well as other aquatic species including crayfish and aquatic invertebrates. These species may be incapable or unlikely to enter a culvert which is not in direct contact with the stream bottom, or they may be incapable of moving through a structure which does not provide a natural surface stream bottom.

Water Quality, Wetland and Riparian Habitats
Undersized, rusted, and/or minimally maintained culverts and surrounding fills have a potential for failure during high precipitation events (20, 50, and 100-year events). A majority of the roads are not maintained to design standards due to budget constraints. Additionally, these failing culverts would probably only be replaced on an emergency basis, that is after the road has failed. These situations typically lead to excessive sediment delivery to the aquatic system resulting in impacts to macro-invertebrate, amphibian, and fish populations. Additionally, culverts installed as emergency replacements are often inadequately designed to address the movement and dispersal needs for aquatic organisms.

Issues Identified and Eliminated from Further Analysis

Economics
Future costs for road maintenance and general road condition is expected to be the same for both the No Action (barring road failure) and Proposed Action, therefore, economics is not an issue with regards to road maintenance within the project areas.

Costs associated with culvert replacements are part of this EA and Analysis File, hereby incorporated by reference. These figures only address the direct costs of replacing the culverts. There is no monetary evaluation of the indirect costs and benefits received from replacing the culverts such as the reduction of sedimentation, improved fish passage/survival (most important to listed species), and effects on other aquatic species passage not previously provided for.

While it could be assumed the cost of the No Action alternative is zero, in actuality the cost could include increased culvert and associated road maintenance costs due to undersized and/or poorly installed culverts. In addition, if these culverts are not replaced there may be additional clean-up costs and impacts to all aquatic species through degradation of the environment associated with road fill/culvert failures. The decision on whether to go forward with the proposed action will take into consideration potential impacts from the No Action

alternative, the costs involved, meeting legal requirements for improving culverts to pass 100 year storm events, and the environmental benefits.

Passage/damage from debris
It is unlikely that many culverts, even properly sized, could survive a large debris torrent in an undamaged state. This 100 year flow sizing will lessen the constriction of flow around the inlet of the culverts and will allow larger debris to pass through the pipe.

Introduction of Non-native Species to the Late-Successional Reserve (LSR)
The Standards and Guidelines of the ROD on page C-19 states that "In general nonnative species (plant and animal) should not be introduced into Late-Successional Reserves." Also both the ROD (pg. C-19) and RMP (pg. 21) state if an introduction of a nonnative species is proposed, complete an assessment of impacts and avoid any introduction that would retard or prevent achievement of LSR objectives.

Since the Districts' past standard soil stabilization and forage mixes included the annual and perennial rye grass, currently being used in the revised District mix. And the old mixes were used since the late '70s/early '80s on a yearly bases throughout the district for soil stabilization/erosion (examples include roads and slides) and in clearcuts for forage. And these grasses are currently present in the LSR. They should not be considered as being introduced.

Experience has shown that these ryes are not invasive or highly competitive, nor do they seem to survive for a long time (especially under shady conditions). Thus these grasses will not retard or prevent achievement of LSR objectives.

At this time, concurred by the Regional Ecosystem Office (pg. E-16 Standards & Guidelines of ROD) and as stated in the *Draft Coos Bay BLM/Roseburg BLM/Siuslaw National Forest LSR Assessment*. "Due to a lack of "native" plant materials, non-native species will most likely be used when areas need to be re-vegetated.....Many of the so called "native" species available from seed companies may not have been collected from the local area, and thus would be considered "non-native natives". In most cases it may actually be better to use these non-native species in these situations to prevent resource degradation (sediment entry into streams) and to prevent potential gene dilution of existing native species populations."

Objectives

. To maintain, protect, or improve the existing infrastructure of our transportation system as recommended through the WSA and TMO interdisciplinary team processes.

. Reduce barriers to movement and dispersal of stream-associated amphibians.

. Reduce barriers to movement and dispersal of anadromous and resident fish.

. Reduce barriers to movement and dispersal of stream-associated invertebrates.

. Reduce the risk of culvert failure and input of large quantities of fine sediments from the road fill to the stream systems.

. Properly size and install culverts to withstand a 100-year flood event.

Permits, Licenses, and Entitlements

All permits, licenses, and entitlements necessary to implement the proposed projects will be obtained by the responsible parties.

Decision(s) to be made

. Not to implement the proposed project (i.e. No Action), or

. Implement the proposed project as described in this EA (i.e. Proposed Action), or

. Implement the proposed project with specific management constraints/mitigation measures.

Section II - Description of Alternatives including the Proposed Action

Present and Future Culvert Selection Criteria for Restoration Projects

Culvert selection criteria for restoration projects were initially based on the availability of upstream salmonid fish habitat and drainage size above the culverts. Roads identified to be kept open under the WSA and TMO processes were also part of the selection process. Paved mainline roads which run adjacent to large streams and have multiple tributaries crossing under the road became the highest priority. The eight culverts addressed in this EA are on paved mainline roads and were identified as high priority restoration projects.

Design Objectives for Culvert Replacement Projects

The following design specifications should be used when replacing or retrofitting stream crossing structures on perennial streams. These structures should be designed to provide a natural stream bottom surface. This can be accomplished by using structures such as 3-sided boxes, bottomless arch pipes or bridges which retain the natural stream bottom intact. Alternatively, culverts may be used if they are designed to trap and retain sediments (gravel) to create a natural surface bottom. The following design specifications should be used when installing, replacing, or repairing culverts on perennial stream crossings.

. Culverts should be sized approximately as wide as the active stream channel to

maintain the natural stream bed width and minimize water velocity within the structure.

. Install culverts at, or slightly below the natural stream grade to facilitate gravel deposition and retention. To maintain a suitable gradient, this may require placing the culvert inlet below the current stream bottom, and allowing the stream channel to downcut above the culvert until the channel stabilizes.

. Install culverts so the outlet is in direct contact with the natural stream bottom to provide access for amphibians, fish, and invertebrates into the culvert.

. Design and install baffles or other devices to promote deposition and retention of natural substrates (gravel and cobble) several inches deep throughout the culvert bottoms to provide low velocity or protected areas within the culverts. This would facilitate passage through culverts by amphibians, fish, and invertebrates.

. Where culverts cannot be installed in contact with the stream bed or where stream velocities are too great, boulder clusters, rock structures, logs, or weirs should be installed to facilitate passage of stream organisms. In such situations, boulder clusters would be used to alter water velocities and encourage deposition of sediments. Rock structures at culvert outlets would provide a direct connection between the streambed and culvert outlet for amphibian passage. Boulder weirs would increase water depths at the culvert outlet providing jump pools for fish.

Standard Stipulations to be Applied to Culvert Projects

. Techniques designed to control water turbidity and sediment (such as stream diversion using high volume pumps and sediment control ponds) need to be used.

. The Contractor/Operator is required to submit evidence of a Spill Prevention and Containment Plan consistent with Oregon Department of Environmental Quality and Forest Practices Act, Oregon Department of Fish and Wildlife (ODFW), and BLM guidelines for in/near stream operations. In addition, a spill containment kit shall be present on site during equipment operations.

. Remove large fills during low stream flow periods. Use silt dams and filters (such as straw bales) to filter sediment from the water. Earthwork should be completed in the dry season, typically mid-June through mid-October.

. During installation, all fill material removed should be placed at stable locations in such a manner as to avoid sedimentation and aid in soil recovery. To further reduce sedimentation, cover such material at the end of each day with plastic to protect the material from hard rain events or multiple exposure to rain.

. Compact all fill materials in lifts of eight inches to ensure soil strength is maintained over culverts.

. Upon completion of construction activities, all exposed soils and waste areas should be stabilized with a mixture of seed, fertilizer, and mulch. Baring availability of a District native seed mix, the current standard mix of an annual and perennial rye should be used.

. Contract should include standard stipulations for cultural resources, hazardous materials, noxious weeds, and special status species.

Alternative No. 1 - No Action

Under this alternative no restoration actions would be carried out. The expected outcomes of the No Action Alternative are summarized in Section IV - Environmental Consequences.

Alternative No. 2 - Proposed Action

This alternative seeks to replace eight stream crossing structures on perennial streams within the Middle Smith, West Fork Smith and Oxbow watershed analysis areas, to provide natural substrate bottoms, which should provide suitable passage for all aquatic organisms (Table 1) and to protect/maintain the roads and their fills.

Two sites, Big Creek #3 and #5, incorporate experimental designs which have not previously been tested. These structures would be installed at a gradient which closely approximates the natural stream gradient. A Conspan is proposed for the Bear Creek site due to the high volume of traffic which this road receives and its importance to local residents.

Table 1. Site name, proposed structure design and estimated cost

Site Name	Structure Type	Internal Structural Features	Inlet / Outlet Placement	Structure Gradient	Associated Structures	Estimated Cost
Bear Creek	Conspan (bottomless)	None	NA	NA	Temporary single lane bypass road above structure	$96,900
Beaver Creek	Multi-plate (bottomless with concrete face)	None	NA	NA	Boulder clusters	$38,500
Moore Creek	Pipe arch (buried)	None	inlet and outlet installed 1.5 ft. below existing stream grade	2 %	None	$30,700
Big Creek # 1	Multi-plate (bottomless)	None	NA	NA	None	$30,100
Big Creek # 2	Pipe arch	Alternating baffles	drop inlet 1.0 ft below existing streambed, place outlet on stream bottom	less than 6.5%	None	$24,400
Big Creek # 3	Pipe arch	Fish weirs with herringbone baffles	drop inlet 1.0 ft below existing streambed, place outlet on stream bottom	less than 9.5%	None	$27,500
Big Creek # 4	Conspan (bottomless)	None	NA	NA	None	$59,700
Big Creek # 5	Pipe arch	Herringbone baffles	drop inlet 6" below existing streambed to bedrock, place outlet on bedrock stream bottom	less than 4%	None	$28,600

Alternatives Considered but Not Analyzed

Due to the structural conditions of the selected culverts, the major road use/needs, the presence of listed fish, watershed restoration recommendations, and legal requirements there were few opportunities for additional alternatives to be consider for this proposal. Those considered but not analyzed are as follow:

Retro-fitting Existing Culverts

This alternative fails to meet the needs of upgrading a failing pipe, meeting new 100 year flow event standards, and reasonably allowing for amphibian passage in the currently existing culverts. Retro-fitting for fish passage is often minimal in its effectiveness and maintenance can be costly.

Road Closure/Pulling Culverts
Roads considered in this EA have been identified as components of the permanent transportation system, through the WSA and TMO process, and are paved mainline roads with reciprocal right-of-ways. These are to be maintained for forest operations and public access.

Section III - Affected Environment

This section describes the environmental components that could be affected at the project sites if the Proposed Action is implemented. This section does not address environmental effects or consequences, but rather serves as the baseline for the comparisons in Section IV - Environmental Consequences. Table 2 describes the existing stream crossing structures, at each project location. The affected environment, including riparian and aquatic habitats, is limited to components found within the existing area of influence of the road and road prism.

Table 2 - Description of existing stream crossing structures

Structure Name	Location	Active Channel Width	Average Existing Stream Channel Gradient for Surveyed Area	Existing Structure and Size (diameter)[1]	Existing Structure Condition	Designed for 100 year event[2]	Limitations to species movement [3]
Bear Creek	T20S/ R09W/ Sec.29/ NW	11'	8.00%	CMP - 3' CMP - 2'	Poor Poor	NO	High water velocity, No substrate, No outlet contact, No jump
Beaver Creek	T20S/ R09W/ Sec.1/ SW	13'	2.85%	PA - 8' / 6'	Fair	NO	High water velocity, No substrate, No outlet contact
Moore Creek	T20S/ R09W/ Sec.11/ SW	12'	2.25%	CMP - 6'	Good	NO	High water velocity, No substrate, No outlet contact
Big Creek #1	T21S/ R08W/ Sec.5/ SE	12'	3.33%	CMP - 2.5' PA - 6' / 3'	Good Good	NO	High water velocity, No substrate, No outlet contact
Big Creek #2	T21S/ R08W/ Sec.5/ SE	10'	2.50%	CMP - 5'	Good	NO	High water velocity, No substrate, No outlet contact
Big Creek #3	T21S/ R08W/ Sec.8/ NW	10'	4.70%	CMP - 4'	Good	NO	High water velocity, No substrate, No outlet contact
Big Creek #4	T21S/ R08W/ Sec.17/ NW	11'	3.75%	CMP - 4' CMP - 4'	Good Poor	NO	High water velocity, No substrate, No outlet contact
Big Creek #5	T21S/ R08W/ Sec. 18/ NE	8'	2.76%	CMP - 2.5' PA-6' / 3.5'	Good Good	NO	High water velocity, No substrate, No outlet contact

1. Structure types - size: CMP = Corrugated metal pipe - measured diameter. PA = Pipe arch - measured span / measured rise.
2. Determination of structures ability to pass water during 100 year precipitation event.
3. Specific physical factors of existing structure designs which limit movement of aquatic organisms.

Wildlife - Including Threatened or Endangered (T&E) Species

There are no known northern spotted owl, bald eagle or peregrine falcon site centers which would be affected by construction activities at the proposed project sites. However, the Moore Creek culvert is within 0.25 miles of an occupied marbled murrelet site, and the Beaver Creek culvert is within 0.25 miles of unsurveyed suitable marbled murrelet habitat. Construction work at the remaining six culvert sites would not affect any occupied marbled murrelet sites or unsurveyed suitable habitat.

Many of the wildlife species native to western Oregon are closely associated with aquatic and riparian habitats. Some species such as songbirds and bats are very mobile, and can easily travel between disjunct patches of habitat. The location and design of stream crossings do not directly affect their ability to utilize the available habitat. Other species, most notably amphibians and aquatic invertebrates, have very limited movement and dispersal capabilities, and may be substantially affected by the design of stream road crossings.

Amphibians are important components of many ecosystems, occupying key trophic positions in the food webs of aquatic systems (Blaustein et al 1995). Adults can be top predators, while the larvae and juveniles are often a major prey source for many species of wildlife (Blaustein et al 1995). Amphibians are the most abundant vertebrate group in many forested ecosystems, and the Pacific Coast harbors a particularly high number of endemic species (deMaynadier and Hunter 1995). Ten species of amphibians are strongly associated with stream habitats in the Umpqua Resource Area (Table 3). These include five salamander, four frog and one toad species. Three species, the Pacific Giant Salamander, the Southern Torrent Salamander and the Tailed Frog have multi-year larval aquatic life stages (Blaustein et al 1995) which make them extremely sensitive to aquatic habitat quality and connectivity. Both the Southern Torrent Salamander and the Tailed Frog are classified as Special Status Species by the Oregon Department of Fish and Wildlife, and the BLM.

Table 3. Amphibian species likely to occur near proposed project sites

Common Name	Latin Name	Special Management Status
Pacific Giant Salamander	*Dicamptodon tenebrosus*	None
Southern Torrent Salamander	*Rhyacotriton variegatus*	Bureau Tracking State Sensitive Critical
Northwestern Salamander	*Ambystoma gracile*	None
Dunn's Salamander	*Plethodon dunni*	None
Rough-skinned Newt	*Taricha granulosa*	None
Pacific Tree Frog	*Hyla regilla*	None
Tailed Frog	*Ascaphus truei*	Bureau Assessment State Sensitive Vulnerable
Red-legged Frog	*Rana aurora*	Bureau Sensitive State Sensitive Vulnerable
Yellow-legged Frog	*Rana boylii*	Bureau Sensitive State Sensitive Vulnerable
Western Toad	*Bufo boreas*	Bureau Tracking State Sensitive Vulnerable

In addition to vertebrates, there are a variety of crustaceans, freshwater mollusks and aquatic insects which inhabit these stream systems, most of which have limited capabilities for movement and dispersal. These invertebrates make up a major portion of the biomass produced in aquatic systems, and play key roles in the aquatic ecosystem; processing the nutrients stored in vegetation and litter entering the stream, and providing major prey sources for a wide variety of aquatic and terrestrial wildlife species (Christensen 1996).

Native Fish Stocks - Including T&E Species

There are a variety of anadromous and resident fish occurring in the selected Watersheds

which are native to this range. The anadromous stocks include fall chinook salmon, coho salmon, winter steelhead trout, sea-run cutthroat trout, and Pacific lamprey. Common resident fish include the cutthroat trout, brook lamprey, and a diversity of dace and sculpin species. The following table lists the indigenous fish species occurring in the Watersheds and their current status as listed by the ODFW**:**

Anadromous fish species	Status
Fall Chinook Salmon	Stable population.
Coho Salmon	Documented depressed populations; Federally listed Candidate.
Winter Steelhead	Suspected declining population; Federally proposed Threatened.
Sea-run Cutthroat trout	Suspected declining population;
- Umpqua Basin stocks	Federally Listed as Endangered.
Pacific Lamprey	Proposed sensitive (statewide).

Resident fish species	
Resident Coastal Cutthroat Trout	Suspected declining population.
Western Brook Lamprey	Status not listed.
Redside Shiner	" " "
Speckled Dace	" " "
Coast Range Sculpin	" " "
Prickly Sculpin	" " "
Riffle Sculpin	" " "
Reticulate Sculpin	" " "

Of the 175 "at-risk" anadromous fish stocks in Oregon listed in *Forest Ecosystem Management Assessment Team* (USDA; USDI 1993), hereby incorporated by reference, Table V-C-3, three occur within the proposed treatment area. The Umpqua Basin cutthroat trout is currently listed as “Endangered” under the Endangered Species Act (ESA), the Oregon coastal coho salmon is listed as a Candidate species and the winter steelhead trout are currently considered proposed for listing under ESA.

The majority of the above species are highly dependent on the smaller tributaries (third through fifth order) for reproduction, growth, and survival. Tributary streams provide the largest amounts of useable spawning substrate and the widest variety of rearing habitats for the multitude of fish species (BLM spawning surveys confirm that in all three of the watershed analysis areas, spawning numbers are highest in the tributaries). Water volumes are generally less, and in-channel complexity is greater, thus offering increased cover and survival potential. Primary and secondary production, via algae and macroinvertebrates (insects), is thought to be higher due to the presence of organic debris accumulations which would in turn affect the amount of food available for fish consumption.

Water Quality, Wetlands, and Riparian Habitats

The stream channels and floodplains within the project areas have been effected by existing roads and crossing structures. Culverts have constricted stream channels causing substrate deposition above culverts, increasing water velocities within the structure and resulting in downcutting of the stream channel below. Sedimentation has not been a problem at these sites, but undersized, rusted, and/or minimally maintained culverts increase the risk for failure of these structures and surrounding fills. Roads constructed in floodplains have constrained the channels and have isolated portions of the floodplain from interaction with the stream.

Cultural Resources

Examination of office records did not indicate that cultural resources were recorded in the vicinity of the proposed culvert replacement localities. Initial culvert placement/construction did not reveal the presence of cultural deposits and this culvert replacement projects will not disturb ground outside of the original disturbance area. Therefore, a field review was not undertaken. Since these locations were disturbed during the initial culvert placement, any additional disturbance during culvert replacement activities will not be likely to affect cultural resources. Should cultural resources be discovered during project work, standard contract language require cession of work and notification of the District Archeologist.

Hazardous Materials

A level one field review by project development personnel has been done and submitted to the Hazardous Materials Specialist. No Hazardous Materials were identified on site and no field review is planned by the specialist. The level one survey form and specialist comments are contained in the analysis file.

Special Status, Survey & Manage, and T&E Botanical Species

No documented special status plants or Survey and Manage strategy 1&2 species occur within or adjacent to the proposed project sites. All sites are within existing road prisms, therefore, it is unlikely that any habitat exists for these plants within the proposed project sites.

Noxious Weeds

No documented noxious weed species occur within the proposed project sites. At present the only identified noxious weed species nearby is scotch broom. Scotch broom is currently beyond control in the three watershed analysis areas of this document.

Port Orford Cedar

The proposed project sites are outside the natural range of Port Orford Cedar.

Section IV - Environmental Consequences

This section is the scientific and analytic basis for the comparison of the No Action and the Proposed Action alternatives described in Section II. The potential direct, indirect, and cumulative impacts to the affected resources are discussed in this section under each alternative. It should be noted that the lands where these projects occur have been previously impacted by the initial construction of roads. No irreversible or irretrievable commitment of resources, other than fossil fuels, have been identified for either of the alternatives.

Critical elements of the Human Environment

The following critical elements of the human environment are not expected to be adversely affected:

- Air Quality
- Areas of Critical Environmental Concern
- Cultural resource values
- Farm lands, prime or unique
- Native American religious concerns
- Hazardous Materials and Solid Wastes
- Wild and scenic rivers
- Wilderness values

Minor short-term impacts could occur to:

- Floodplain
- Threatened and Endangered Species (plants or animals)
- Water Quality
- Wetlands and Riparian Zones
- Noxious Weeds

Analysis of Design Types Relating to Specific Design Features

The physical characteristics and biological effectiveness for each design (based on collective knowledge and observations of the IDT) is summarized in Table 4. This table is supported by a more detailed analysis, contained in the appendix, of each design type relative to specific design features.

Aquatic habitats in Western Oregon have been impacted by decades of agricultural and logging practices, road construction, fires, and removal of woody structure from stream channels. Road systems in particular encroach upon streams, augment runoff, prevent the transport of coarse material downstream, and restrict movement of aquatic and riparian

associated species at stream crossings. Culverts, the primary structure used for stream crossings, frequently function as barriers to the movement of these species. While many culverts are passable to adult salmonids, most are not designed to allow passage for smaller sized fish such as juvenile salmonids, sculpin, dace and resident cutthroat trout. Furthermore, very few culverts retain natural substrate on the bottom of the pipe, and most are not in direct contact with the stream bottom, thus making them impassable for most amphibians and invertebrates. These human created barriers have broken the continuous stream network into a series of isolated habitat segments, which provide little or no opportunity for genetic exchange or dispersal between many fish and wildlife populations.

The planning area includes the Middle Smith, West Fork Smith River and Oxbow watershed analysis areas. Aquatic habitat quality within these drainages ranges from poor to good depending upon the stream reach (based on ODFW habitat surveys). The majority of the better quality aquatic habitats occur in the tributaries that feed the mainstems of these systems. Large woody debris, organic matter accumulations and the presence of large amounts of cobble and gravel substrates provide abundant breeding and rearing habitats for fish, amphibian, and invertebrate species. In comparisches are mostly dominated by bedrock substrates and generally lack wood, fine organic materials, and a variety of habitats necessary for the production of aquatic organisms.

Table 4 - Effectiveness of road crossing structure designs related to specific design criteria and cost

Stream Crossing Structure	Retain Natural Stream Substrate Throughout Full Length of Structure	Maintain Natural Stream Gradient Throughout Structure	Maintain Unimpeded Upstream Access Throughout Structure for all Aquatic Species	Pass Gravel & Debris Through Structure	Meets ACS Objectives	Example of Cost using a Structure 10.5' Diameter by 80' Long
Arch countersunk without weirs	Effective	Effective	Effective	Partially Effective	Yes	$31,200
Arch with alternating baffles and minimized grade (12 baffles)	Effective	Effective	Effective [2]	Partially Effective [3]	Yes	$35,100
Arch with herringbone baffles (12 baffles)	Effective	Effective	Effective [2]	Partially Effective [3]	Yes	$35,100
Arch with Fish Weirs (9 weirs)	Ineffective	Ineffective	Partially Effective [1]	Partially Effective [3]	No	$35,700
Arch with combined Fish Weirs and herringbone baffles (6 weirs, 12 baffles)	Ineffective	Ineffective	Partially Effective [1]	Partially Effective [3]	No	$39,600
Arch with combined Fish Weirs and alternating baffles (9 weirs, 12 baffles)	Ineffective	Ineffective	Partially Effective [1]	Partially Effective [3]	No	$39,600
Multi-plate Arch (bottomless)	Highly Effective	Highly Effective	Highly Effective	Partially Effective [3]	Yes	$44,500
Multi-plate Arch with concrete face (bottomless)	Highly Effective	Highly Effective	Highly Effective	Effective [4]	Yes	$47,000
3-sided Conspan (bottomless)	Highly Effective	Highly Effective	Highly Effective	Highly Effective [5]	Yes	$79,600

[1] Effective at passion only salmonid fish species.
[2] It may require several years for deposition to occur.
[3] The smaller size and reduced durability of these metal structures makes them less effective at passing large debris or withstanding damage from debris torrents.
[4] Due to the durability of the concrete face of these structures, they are more effective than unfaced metal culverts at withstanding damage from debris torrents.
[5] Due to the larger size and durability of these concrete structures, they are more effective a passing large debris and withstanding damage from debris torrents.

Alternative 1 - No Action

Wildlife - Including T&E Species

Direct and Indirect Affects
Under this alternative, all eight culverts would remain impassable to most amphibian and invertebrate species. Culvert outlets would remain isolated from the streambed surface and

inaccessible to species which are weak swimmers or move along the stream bottom. Without structures designed to trap and retain natural substrate, little sediment is likely to be deposited or remain within these pipes. Most amphibian species would be incapable of traveling through these structures to reach the habitat upstream. This would limit movement and dispersal to species capable of extensive overland travel. Although adult amphibians are capable of overland travel, research strongly suggests that forest roads are serious barriers to overland migration for many species (deMaynadier and Hunter 1995). Species such as Southern Torrent Salamanders would remain effectively isolated from adjacent populations. Even species such as Pacific Giant Salamanders and Tailed Frogs which are capable of overland travel as adults, would be at much greater risk of mortality from hostile environmental conditions, predation or vehicle traffic. Retaining these culverts in their current conditions would effectively isolate populations of many wildlife species within small stream segments.

Cumulative Affects
Under this alternative, opportunities to restore the continuity of the stream ecosystem within these drainages would be foregone. The potential for genetic exchange between numerous isolated populations of many aquatic and riparian wildlife species would be extremely limited. Likewise, the potential for these species to successfully recolonize sites from which they are extirpated, even after the habitats recover would be extremely low. Most stream crossings maintained by adjacent private landowners are unlikely to be upgraded to facilitate passage of non-salmonid species. If federally maintained stream crossings throughout the landscape also continue to function as barriers to wildlife movement and dispersal, populations of affected species are likely to experience further declines.

No effects to northern spotted owls, peregrine falcons, bald eagles or marbled murrelets are expected.

Native Fish Stocks - Including T&E Species

Direct and Indirect Affects
Under this alternative, many fish species would not be able to access historic habitats above impassable culverts. The survival and reproduction of local populations could possibly decline if individuals remain limited to mainstem habitation. Observations following the flood of November 15-17, 1996 showed many salmonid juveniles dead along mainstem stream banks. It is likely that losses would have been reduced if access into smaller tributary streams above culverts had been available. In addition, the ESA states that “it is the responsibility of the agency to carry out programs for the conservation of threatened or endangered species” (Section 7 (a), (USDI 1988). For the Endangered Umpqua Basin cutthroat trout, the candidate coho salmon and the proposed steelhead trout, following this alternative would not fulfill agency responsibilities.

Cumulative Affects
Fish species having restricted access to historic spawning and rearing areas have the likelihood of becoming proposed or listed species in the future. Currently listed or proposed species run the risk of receiving more severe listings (Proposed to Threatened or Threatened

to Endangered). Limiting the availability of fish to move in and out of the tributary streams places added importance to mainstem rearing and spawning habitat. Given the poor to fair condition of most mainstem habitats and riparian areas, it is unlikely that optimum habitats will be available for at least several decades. Due to low numbers, sensitive fish populations may decline and be unable to withstand natural catastrophic events such as flooding or drought.

Water Quality, Wetlands, and Riparian Habitats

Direct and Indirect Affects
Plugged or undersized culverts would continue to pose a risk of road surface and road fill failure. Fill material on top of these culverts could be delivered to the stream network through diversions and fill failures during flood events. Episodic sediment delivery at these locations would impact downstream aquatic habitats. Streams would remain constrained by roads. Deposition above and downcutting below culverts would continue. No direct affects to floodplains would be expected to occur. It is possible that Water Quality Standards for the State of Oregon would not be met.

Cumulative Affects
In the long-term, delaying replacement of these culverts would likely create a greater adverse impact to aquatic and riparian resources than the proposal to replace them. If the old culverts fail, there is a high probability that excessive sediments would be released and delivered to streams. If culverts are not replaced, the opportunity may be foregone until after they completely fail.

Cultural Resources/Hazardous Materials/Port Orford Cedar/Noxious Weeds/Nonnative Species
No direct, indirect, or cumulative impacts are expected even if site failure should result from the No Action Alternative. No cultural resources have recently been located nor were found at the time of initial construction. No solid wastes or hazardous materials were discovered on or near the project sites. The project sites are outside the natural range of Port Orford Cedar. At present the only nearby noxious weed identified is scotch broom. Scotch broom is currently beyond control in the watershed analysis areas. If site failure should occur, causing the disturbance favored by scotch broom and resulting in additional plants becoming established, current conditions would not be significantly changed. It is unlikely that the two ryes used in the past for erosional control will grow on this site if failure should occur.

Special Status, Survey & Manage, and T&E Botanical Species
No direct, indirect, or cumulative impacts are expected. Under the No Action plan current site conditions are not expected to significantly change.

Design Features
No immediate actions would be undertaken to improve the condition, function or capacity of

existing culverts.

Effectiveness of No Action Design Features
It is possible that Water Quality Standards for the State of Oregon would not be met. Rusting, undersized culverts, and existing restrictions to stream, fish and amphibian passage would continue unabated.

Monitoring of No Action
Monitoring of road systems are performed in conjunction with routine maintenance inspections. These are conducted annually on major roads and generally every two or three years on smaller spur roads. Decreases in funding and manpower has impacted inspection schedules and maintenance. Inspections are also done after large storm events, or during storms if safety permits

Alternative #2 - Proposed Action

Wildlife - Including T & E Species

Direct and Indirect Affects
The replacement of 8 existing culverts with structures designed to: 1) accumulate and retain a natural sediments (gravel and cobble) throughout their length, and 2) provide direct connection between the stream bottom and the outlet of the structure, should substantially improve opportunities for upstream movement and dispersal of most stream and riparian associated wildlife species. Installing replacement culverts with the outlet in direct contact with or just below the surface of the streambed would provide amphibians and aquatic invertebrates direct access to the inside of the structure without leaving their habitats along the stream margin or bottom. Species which are weak swimmers, or typically avoid moving in higher velocity portions of the stream would be able to access the culvert without leaving the streambed or protection of interstitial spaces between the gravel and cobble which are their primary habitat.

The species associated with Western Oregon streams are well adapted to traversing the complex habitats present in natural streams. The larger types of sediment (gravel, cobble and rock) found in natural streams provide roughness that reduces water velocity along the streambed, and creates numerous small pockets of quiet water. Aquatic wildlife species which are weak swimmers (such as many amphibians and aquatic invertebrates), or typically travel along the streambed, are adapted to take advantage of these low velocity areas, and are able to move along the protected bottom of even high velocity streams. Additionally, many species such as Southern Torrent Salamanders move through the interstitial spaces between these large sediments, where they are protected from predators as well as high velocity stream flows. By trapping and retaining a layer natural sediment, the culvert bottom would much more

closely mimic natural streambed to which the native species are adapted. This should greatly facilitate the movement and dispersal of all stream associated native species, and help resity of the natural stream habitats throughout the drainage.

The species inhabiting small segments of the stream immediately below the structures being replaced may experience minor short-term impacts caused by excavation and installation of the structure. These impacts could include deposition of fine sediments on existing gravel or cobble substrates, physical disturbance of existing habitats, and displacement or killing of individuals immediately adjacent to the project site. However, construction work will be conducted from the existing road surface and physical disturbance to the stream would be minimized. Contract stipulations require this work to be completed using management practices which minimize sediment delivery to the stream. The direct impacts to wildlife species from excavation and installation of these structures are expected to be minimal.

Construction work at six of the eight proposed culvert replacement sites would not cause disturbance of any known bald eagle nest sites, spotted owl site centers, occupied marbled murrelet sites or unsurveyed suitable murrelet habitat. Work at these six sites would not require compliance with any timing restrictions for these species. However, the Moore Creek culvert is within 0.25 miles of an occupied marbled murrelet site, and the Beaver Creek culvert is within 0.25 miles of unsurveyed suitable marbled murrelet habitat. Disturbance from construction work occurring at these sites may affect marbled murrelets. The FY 1995 Biological Opinion authorized a limited amount of Incidental Take due to short duration low to moderate level disturbance projects (which include culvert replacement), provided these projects are conducted within specific seasonal time restrictions defined in the Biological Assessment. To remain in compliance with these time restrictions, work at the Beaver Creek culvert site can not be conducted between March 1 and May 15, and work at the Moore Creek culvert site can not be conducted between March 1 and July 15. Furthermore, during the murrelet breeding season (April 1 to September 15), daily work at these two sites can begin no earlier than 2 hrs after sunrise and must end 2 hrs before sCumulative Affects
Installing culverts which trap and retain a layer of natural substrate and remain in direct contact with the streambed should restore the continuity of aquatic habitat within the stream network, and provide relatively unimpeded passage for all aquatic and riparian associated wildlife species. This should help restore genetic exchange between small wildlife populations which have been isolated by prior human actions, and facilitate natural recolonization of habitats from which species have been extirpated by human caused or natural events. Minimizing human caused barriers to genetic exchange and recolonization should insure that the stream ecosystem and associated wildlife populations remain as vigorous and resilient as possible.

Native Fish Stocks - Including T & E Species

Direct and Indirect Affects
Using the design features of the proposed action would allow for all fish passage through the replaced culverts. Gravel catching structures within the culverts would provide the friction necessary to reduce microhabitat velocities throughout portions of the pipe, thus allowing

small fish to move through the culvert. Culverts that are flush with the stream bottom or have rock structures at their outlets would provide connectivity for those fish species which have little to no jumping abilities (i.e. sculpin). Allowing fish the opportunity to access their historic habitats would help to ensure maximum habitat usage by all life history stages of all species. Those salmoides that are currently threatened or proposed species would have improved opportunities for reproduction and survival when given access to smaller tributary streams.

It is likely that there would be some immediate sedimentation downstream due to the removal of the culverts. The duration should not last more than 2-3 days. An additional influx if sediment may occur following the first rain event in the fall due to disturbances at the site. It is unlikely that this sedimentation would significantly affect fish near the replacement site.

Although there would be minor impacts to listed fish species, a Biological Opinion and letter of concurrence was received from National Marine Fisheries Service approving the proposed project due to the long term benefits to these species.

Cumulative Affects
All fish species would have the opportunity to access historic spawning and rearing grounds for several decades (the average life span of a culvert is 25-30 years). This would allow them to move freely thus mimicking the natural habitat known as a gravel/cobble dominated riffle. Survival and reproduction opportunities would be improved over the long term, and, combined with other management strategies, populations of sensitive species could increase. All fish species would have the increase ability to withstand natural events (flood, drought) that lead to population declines.

Water Quality, Wetlands and Riparian Habitats

Direct and Indirect Affects
The design features of the proposed action and use of Best Management Practices (BMP's) (Appendix H, RMP, 1994) during culvert replacement would reduce many potential adverse effects to water quality. The potential for large scale sediment delivery in the form of road or culvert failures would be replaced with short-term (1-3 years), low level sedimentation resulting from exposed soil where the culverts are replaced. Most of the sediment would be delivered in the first rain event of the fall after culvert replacement. Once vegetation is established on these areas, there should be negligible erosion or sedimentation. The risk of failure during large storm events would be reduced by the installation of culverts designed to handle the 100 year flood stage. Removal of some riparian trees and brush may occur in the vicinity of the road grade and large culverts to allow for proper alignment, but this should not significantly impact soil and hillslope stability. Streams would remain constrained by roads. Redistribution of stream substrates would occur above, within and below the structures restoring a more natural gradient to the stream. At the Bear Creek site, short term impacts to the floodplain would be caused by the construction of a temporary bypass road needed to maintain traffic flow on Smith River Road. However removal of the temporary fill immediately after installation of the structure should minimize any associated effects.

Cumulative Affects
Increasing the size of the culverts to withstand a 100-year flood event would reduce the potential for culverts to become plugged. In general, most culverts plug at the inlet during rising and peak water levels. When culverts are undersized, the constriction of water flow at the inlet causes sediment to accumulate, which may partially or completely plug the culvert. Additionally, when these culverts are full of water, large amounts of debris cannot pass through the pipe. If the accumulation of sediment, debris, or a combination of both effectively plugs the culvert, the road surface, road fill, and/or culvert may be washed out. Larger structures reduce the potential risk for plugging, and associated road surface or road fill failure.

Cultural Resources
No direct, indirect, or cumulative impacts are expected. Each project area has been previously disturbed during initial road construction or culvert installation. The Proposed Action will not result in additional ground disturbance beyond the original disturbed sites.

Hazardous Materials
No effects are anticipated from the proposed action unless a release of hazardous materials occurs as a result of operations. Depending upon the substance, amount, and the environmental conditions, in the area affected by a release, the impacts could range from minimal to lasting and significant. However, BMP's with spill kits and containment plans should minimize the risk.

Special Status, Survey & Manage, and T&E Botanical Species
No direct, indirect, or cumulative impacts are expected. Each project site has been previously disturbed during initial road construction or culvert installation.

Noxious Weeds

Direct and Indirect Affects
Direct impacts could occur since washing of vehicles and heavy machinery only reduces the amount of seeds carried by equipment, it does not eliminate all of them. Thus noxious weeds could be introduced to the project sites if present on the vehicles or heavy machinery and they fall off and germinate. Also, indirect impacts could occur after the ground disturbing activities and before the site is recaptured by grass seed or native plants. During this time the site will be susceptible to invasion by nearby scotch broom.

Cumulative Affects
If a new noxious weed is introduced it should be identified and reported. All new introductions of noxious weeds receive the highest treatment priority to prevent them from becoming established and spreading. Chances are good that any new introduction will be eradicated before it becomes well established and the discussion following applies to any noxious weeds

that flourish on disturbed sites. If scotch broom plants grow on the project sites they would be an insignificant addition to the currently uncontrollable population in the watershed analysis areas. However, in the long run, population densities and affects should decline due to increased shading from native plants resulting from the NWFP and District RMP management directives. These documents provide different land use classifications with varying ages that should result in longer periods of non-site disturbance and shading. This shading of the scotch broom seed beds and decrease in disturbed sites/site size may result in net decrease of this and similar species. The seeds survival rate is generally less than 100 years.

Required Mitigation Measures for Construction Near Suitable Marbled Murrelet Habitat

Due to the presence of an occupied marbled murrelet site near Beaver Creek, and unsurveyed suitable habitat near Moore Creek, work at the Beaver Creek culvert site can not be conducted between March 1 and May 15, and work at the Moore Creek culvert site can not be conducted between March 1 and July 15. Furthermore, during the murrelet breeding season (April 1 to September 15), daily work at these two sites can begin no earlier than 2 hrs after sunrise and must end 2 hrs before sunset.

Design Features for Noxious Weeds

All vehicles and heavy machinery should be steamed or power washed prior to entry on public lands, to prevent the introduction of noxious weeds.

Effectiveness of Proposed Action Design Features

By use of Best Management Practices [BMP] (Appendix D of RMP; includes timing and scheduling of activity, methodology, equipment, project design, and erosion control) the Proposed Action is expected to meet or exceed Water Quality Standards for the State of Oregon and the Coos Bay District's RMP. In addition the incorporation of the specific design features, and environmental protection measures and mitigations discussed here in Section II should prevent negative impacts to resources, meet current legal requirements, and improve passage of amphibians, fish, and woody debris.

Monitoring of Proposed Action

. Compliance monitoring of the Proposed Action should be performed by the BLM Project Inspector (PI) for the project contract. It is the PI's responsibility to ensure compliance with contractual stipulations (including design features).

. Stream crossing structures would be monitored annually (at a minimum) by area biologists for at least 3 years after design objectives are initially achieved or modifications are deemed necessary. Monitoring would be designed to measure changes in substrate presence and distribution within the structure, and the ability of the structure to maintain connectivity with the stream bed at the inlet and outlet. Monitoring would consist of;

- visual inspections of each culvert, recording detailed descriptions of substrate

abundance and distribution,
- a description of the connection between the structure outlet and stream bottom, and a measurement of the distance between them,
- a series of photos including the inlet, outlet and representative location within each structure.

*****NOTE: As with any stream system, the movement of larger sediments such as gravel and cobble are directly dependent on large precipitation events that increase water velocities throughout a system. Large sediments may move only feet downstream during drought years but potentially hundreds of feet or more during flood events. It could therefore take several years for gravels to settle inside the culverts once they are replaced. This is an expected and acceptable process.

3. Culverts would be inspected and maintained on a routine basis, following the guidelines recommended in the District Transportation Plan to meet ACS objectives.

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APPENDIX

Arch pipe with fish weirs

This design meets the criteria for adequate size and shape, but does not allow for adequate deposition of substrates throughout the full length of the culvert. Observations of culverts installed with this design over the last 3 years have shown consistent scour and depositional areas within specific portions of the culvert (See Figure 1). In general there are pools created above each of the fish weirs. Within each pool the upper one-third is scoured down to metal and the lower two thirds are composed of a variety of natural substrates. The self-cleaning, angled design of the weirs within the culvert create continual scouring below each of the weirs. As velocities decrease downstream from the weir, substrates deposit and build above the next downstream weir. In all observed cases the uppermost pool completely lacks gravel substrate. This is due to the scouring effects caused by a perpendicular weir at the entrance of the culvert. In no observed cases has there been continuous gravel retained throughout the length of the culvert.

Additionally, to create a pool at the outlet which backs water up to the first weir, the culverts are being installed below the existing stream bed at the outlet. In many cases this has increased the gradient of the culvert substantially above the natural stream gradient.

Biologically this design allows only for salmonid fish passage. It is most likely a barrier to native fish whose jumping ability is minimal (i.e. sculpin species). It is also a barrier to amphibian and invertebrate species whose primary mode of transportation is crawling along the stream bottom. The lack of continuous gravel throughout the length of the culvert does not allow for movement of these species. The weirs themselves may also function as barriers to upstream passage of many species because of their downstream angled design. Species which move along the stream bottom would need to scale an overhanging 18" metal weir in an upside down position. The V-notch in the weir creates an area of high velocity and continual scouring that is likely to prove impassible to aquatic organisms with limited swimming abilities (i.e. sculpins, amphibians, and invertebrates).

Arch pipe with fish weirs and baffles

This design should meet the criteria for adequate size and shape but may not allow for deposition of substrates throughout the length of the culvert. The design is new and has not been attempted. It appears that the addition of baffles in combination with the fish weirs may allow for deposition between weirs, but that the angled fish weirs will produce the same scouring effect below each weir as mentioned in the above Arch-Pipe-with-Fish-Weir design. It is unlikely that there will be continuous gravel throughout the length of the culvert using this design.

Additionally, to create a pool at the outlet which backs water up to the first weir, the culverts are being installed below the existing stream bed at the outlet. In many cases this has increased the gradient of the culvert substantially above the natural stream gradient.

The effectiveness of this design should be similar to the arch pipe with fish weirs described above allowing only for salmonid fish passage. The V-notch in the weir creates an area of high velocity and continual scouring that is likely to prove impassible to aquatic organisms with limited swimming abilities (i.e. sculpins, amphibians, and invertebrates).

Arch pipe with fish weirs and herring bone baffles

This design should meet the criteria for adequate size and shape but may not allow for

deposition of substrates throughout the length of the culvert. The design is new and has not been attempted. It appears that the addition of modified baffles in combination with the fish weirs may allow for deposition between weirs, but that the angled fish weirs will produce the same scouring effect below each weir as mentioned in the above Arch-Pipe-with-Fish-Weir design. It is unlikely that there will be continuous gravel throughout the length of the culvert using this design (See Figure 2). Although the design of the center weir notch is significantly wider than other weir designs, flows would still be concentrated at these points, creating continual scour of substrates immediately below the notch.

Additionally, to create a pool at the outlet which backs water up to the first weir, the culverts are being installed below the existing stream bed at the outlet. In many cases this has increased the gradient of the culvert substantially above the natural stream gradient.

The effectiveness of this design should be similar to the arch pipe with fish weirs described above allowing only for salmonid fish passage. The notch in the weir creates an area of high velocity and continual scouring that is likely to prove impassible to aquatic organisms with limited swimming abilities (i.e. sculpins, amphibians, and invertebrates).

Arch pipe with alternating baffles

This design should meet the criteria for size, shape, gradient and substrate retention. Observations from several culverts (on different gradient streams) previously installed with this design have shown continuous gravel retention throughout the length and on at least one side of the culvert (See Figure 3). Continuous gravel was retained throughout the course of a 100-year flood event.

If the gradient, substrate characteristics and flow conditions within the structure are similar to those of the stream channel above and below the structure, the ability for aquatic species to move upstream should not be limited by these structures. The alternating baffle structures are designed to retain stream substrates, mimicking the habitat found in natural riffles. The irregularity and roughness of the substrates create a wide variety of micro-sites which provide velocity breaks and resting areas for small organisms. During low summer flows, this design allows the flow to cut a channel through the gaps between alternating baffles. This channel allows for fish movement at low flows when sufficient water for movement is available in the natural stream channel above and below the structure. Amphibians and invertebrates should be able to move either across the moist exposed substrates, or up the water course depending on stream flow conditions.

Arch pipe with herringbone baffles

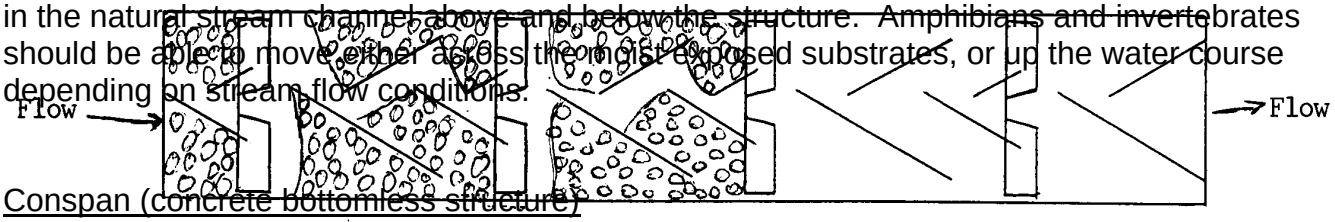
This design should meet the criteria for size, shape, gradient and substrate retention. If the gradient, substrate characteristics and flow conditions within the structure are similar to those of the stream channel above and below the structure, the ability for aquatic species to move upstream should not be limited by these structures. The herringbone baffle structures are designed to retain stream substrates, mimicking the habitat found in natural riffles. The irregularity and roughness of the substrates create a wide variety of micro-sites which provide velocity breaks and resting areas for small organisms. During low summer flows, this design allows the flow to cut a channel through the gaps between alternating baffles. This channel allows for fish movement at low flows when sufficient water for movement is available in the natural stream channel above and below the structure. Amphibians and invertebrates should be able to move either across the moist exposed substrates, or up the water course

depending on stream flow conditions.

Arch pipe countersunk below natural stream grade

This design should meet the criteria for size, shape, gradient and substrate retention provided that the culvert is as wide as the active stream channel, installed on a grade less than 3%, and does not exceed the natural stream channel gradient. By countersinking the structure, natural substrates should fill the bottom, thus mimicking the natural stream bed within the culvert and providing habitat continuity between the stream above and below the road crossing. If the gradient, substrate characteristics and flow conditions within the structure are similar to those of the stream channel above and below the culvert, the ability for aquatic species to move upstream should not be limited by these structures. During low summer flows, this design allows the flow to cut a channel through the substrate as occurs in natural streambed. This channel allows for fish movement at low flows when sufficient water for movement is available in the natural stream channel above and below the structure. Amphibians and invertebrates should be able to move either across the moist exposed substrates, or up the water course depending on stream flow conditions.

FIGURE 2: FISH WEIRS WITH HERRINGBONE BAFFLES:



Conspan (concrete bottomless structure)

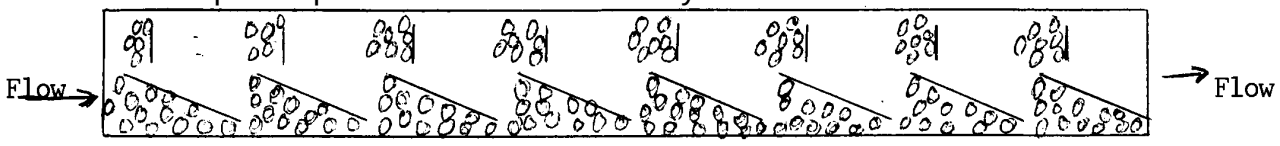
This design meets the criteria for size, shape, gradient, outlet contact with the stream bottom and substrate retention because the structure does not alter the natural stream bottom, and movement of aquatic species should be limited by this structure.

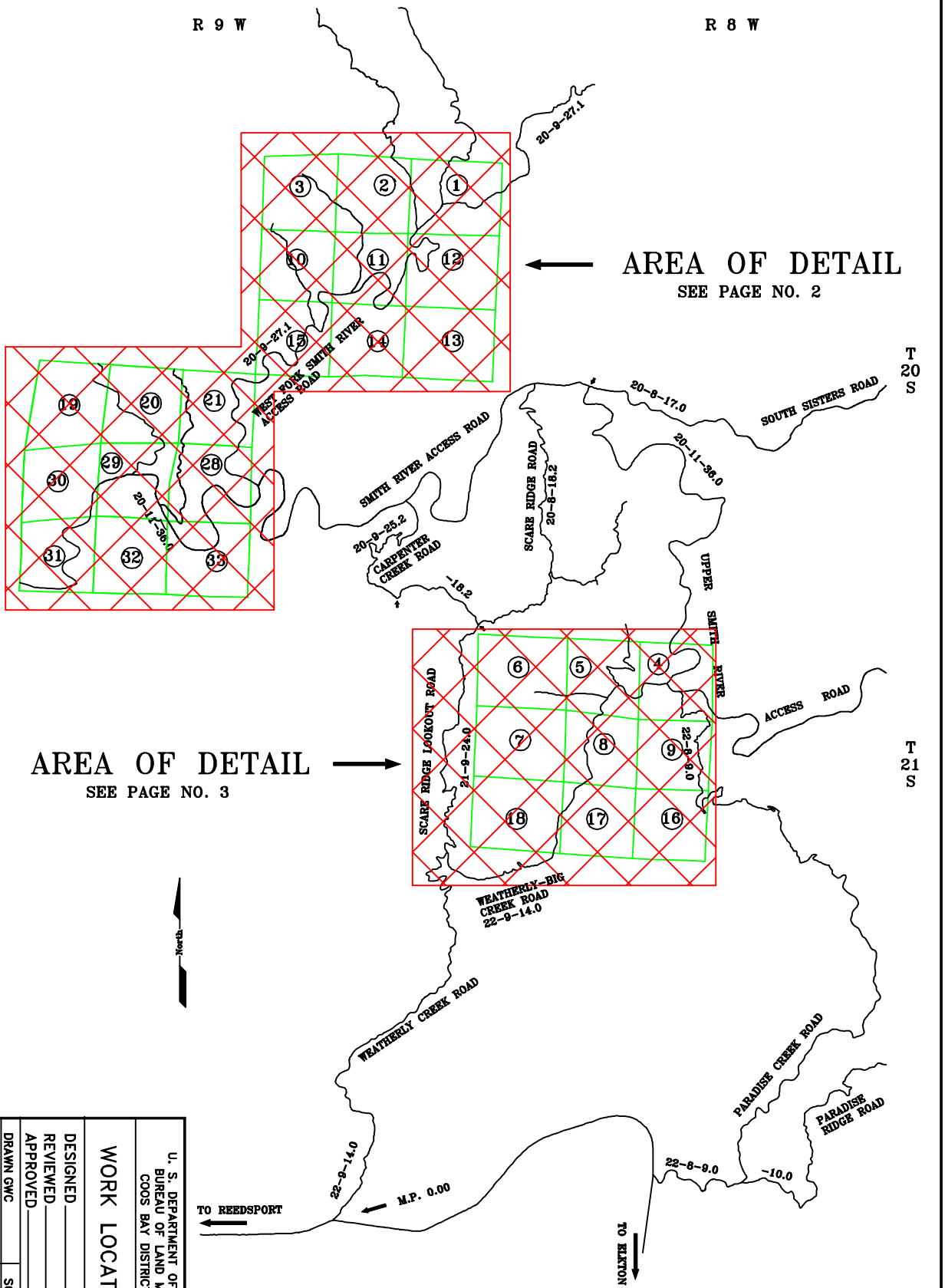
Fish Weir Notch - Scour and Deposition same as above

Multi-plate (metal bottomless structure)

This design meets the criteria for size, shape, gradient, outlet contact with the stream bottom and substrate retention because the structure does not alter the natural stream bottom, and movement of aquatic species should be limited by this structure.

ALTERNATING BAFFLE DESIGN:
FIGURE 3





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COOS BAY DISTRICT OREGON

WORK LOCATION MAP

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APPROVED

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SCALE NONE

DATE 2/97
SHEET 2 OF 24

DRAWING NO.

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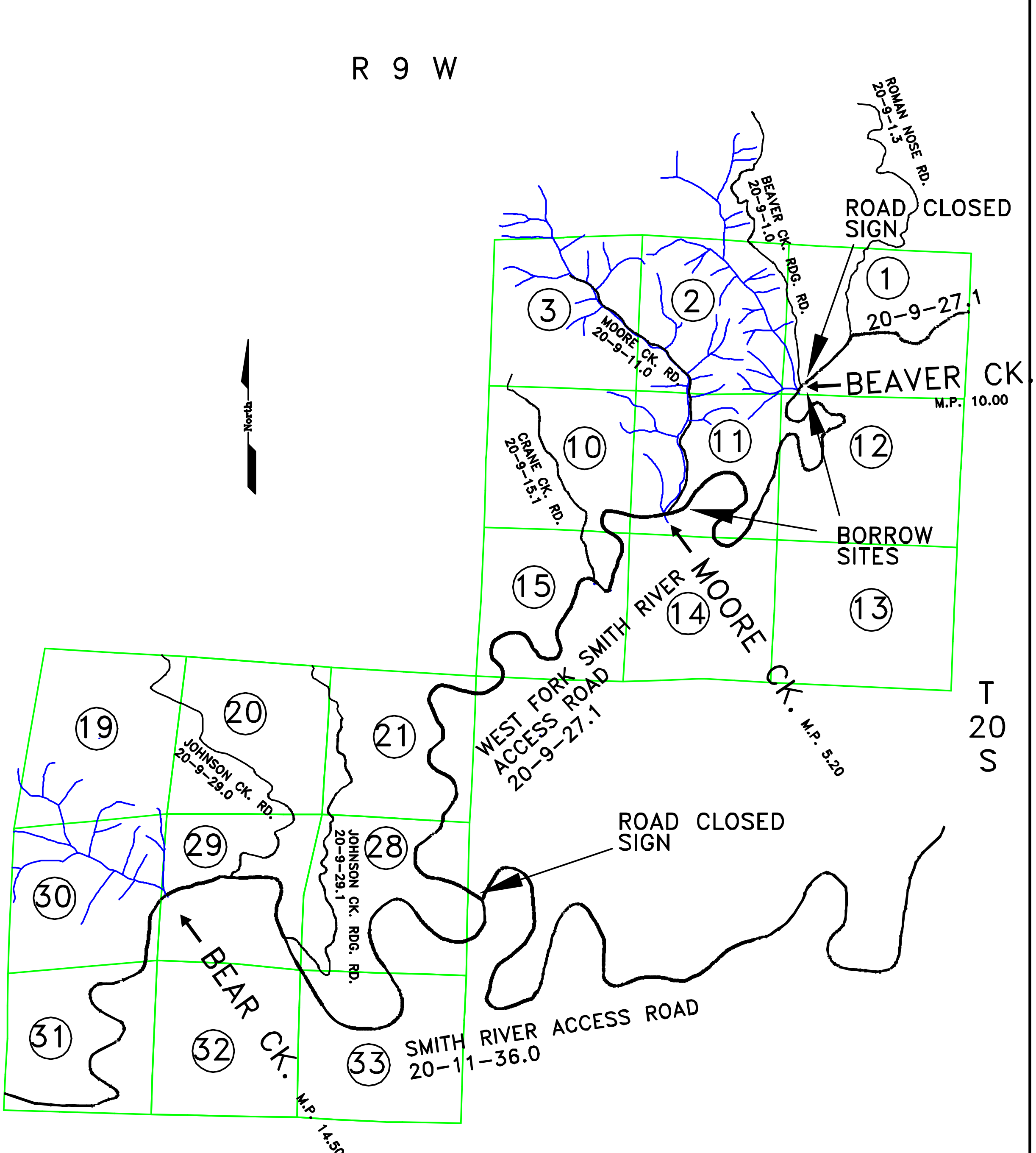

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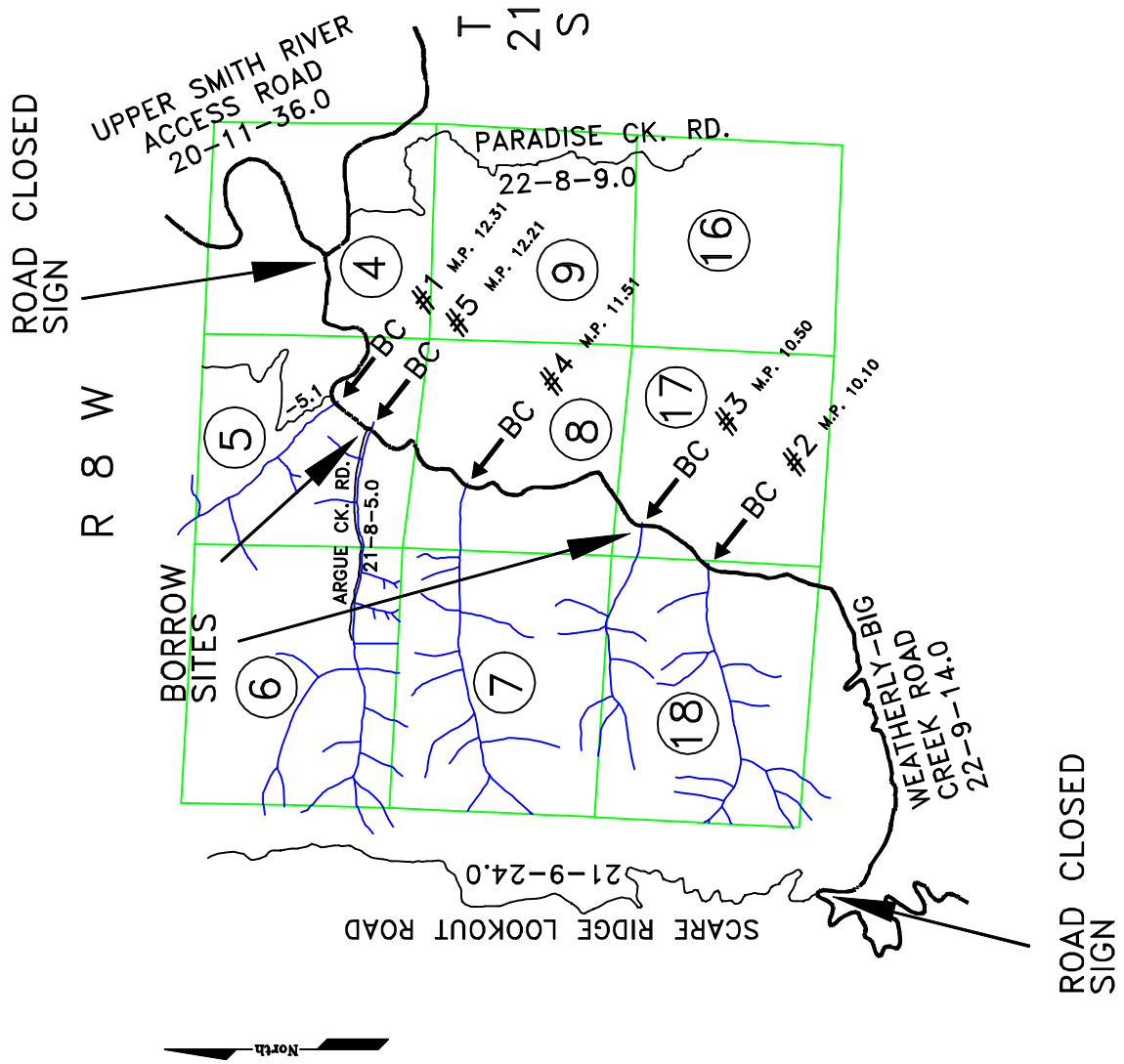

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WORK LOCATION MAP	
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